

WHAT IS CLAIMED IS:

1. A light-emitting device comprising:
 - a light-emitting unit configured to emit a first light radiation, wherein the light-emitting unit includes a plurality of first connecting pads;
 - 5 a base substrate configured to emit a second light radiation when stimulated by the first light radiation, wherein the base substrate includes a plurality of second connecting pads; and
 - a plurality of conductive bumps connecting the first connecting pads of the light-emitting unit to the second connecting pads of the base substrate.
- 10 2. The light-emitting device of claim 1, wherein the light-emitting unit is a light-emitting diode configured to emit blue light.
3. The light-emitting device of claim 1, wherein the base substrate is
- 15 configured to emit yellow light when stimulated by the first light radiation from the light-emitting unit.
4. The light-emitting device of claim 1, wherein the light-emitting unit comprises:
 - 20 a first substrate;
 - a first cladding layer;
 - an active layer;
 - a second cladding layer; and
 - first and second ohmic contact layers;

wherein the first connecting pads are connected to the first and second ohmic contact layers.

5 5. The light-emitting device of claim 4, wherein the first substrate includes a sapphire substrate, a SiC substrate or the like.

6. The light-emitting device of claim 4, wherein the first cladding layer includes an n-type GaN layer.

10 7. The light-emitting device of claim 4, wherein the active layer includes a multi-quantum well multi-layer structure or a single well structure.

8. The light-emitting device of claim 4, wherein the second cladding layer includes a p-type GaN layer.

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9. The light-emitting device of claim 4, wherein the first ohmic contact layer includes is made of a metallic alloy including Ti/Al, Ti/Al/Ti/Au, Ti/Al/Pt/Au, Ti/Al/Ni/Au, Ti/Al/Pd/Au, Ti/Al/Cr/Au, Ti/Al/Co/Au, Cr/Al/Cr/Au, Cr/Al/Pt/Au, Cr/Al/Pd/Au, Cr/Al/Ti/Au, Cr/Al/Co/Au, Cr/Al/Ni/Au, Pd/Al/Ti/Au, Pd/Al/Pt/Au, Pd/Al/Ni/Au, Pd/Al/Pd/Au, Pd/Al/Cr/Au, Pd/Al/Co/Au, Nd/Al/Pt/Au, Nd/Al/Ti/Au, Nd/Al/Ni/Au, Nd/Al/Cr/Au, Nd/Al/Co/A, Hf/Al/Ti/Au, Hf/Al/Pt/Au, Hf/Al/Ni/Au, Hf/Al/Pd/Au, Hf/Al/Cr/Au, Hf/Al/Co/Au, Zr/Al/Ti/Au, Zr/Al/Pt/Au, Zr/Al/Ni/Au, Zr/Al/Pd/Au, Zr/Al/Cr/Au, Zr/Al/Co/Au, TiN_x/Ti/Au, TiN_x/Pt/Au, TiN_x/Ni/Au, TiN_x/Pd/Au, TiN_x/Cr/Au, TiN_x/Co/Au TiWN_x/Ti/Au, TiWN_x/Pt/Au, TiWN_x/Ni/Au,

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TiWN_x/Pd/Au, TiWN_x/Cr/Au, TiWN_x/Co/Au, NiAl/Pt/Au, NiAl/Cr/Au, NiAl/Ni/Au, NiAl/Ti/Au, Ti/NiAl/Pt/Au, Ti/NiAl/Ti/Au, Ti/NiAl/Ni/Au, Ti/NiAl/Cr/Au or the like.

10. The light-emitting device of claim 4, wherein the second ohmic contact
5 layer is made of a metallic alloy including Ni/Au, Ni/Pt, Ni/Pd, Ni/Co, Pd/Au, Pt/Au, Ti/Au, Cr/Au, Sn/Au, Ta/Au, TiN, TiWN_x, WSi_x or the like.

11. The light-emitting device of claim 4, wherein the second ohmic contact
layer is made of a transparent conductive oxide including indium tin oxide, cadmium tin
10 oxide, ZnO:Al, ZnGa₂O₄, SnO₂:Sb, Ga₂O₃:Sn, AgInO₂:Sn, In₂O₃:Zn, NiO, MnO, FeO, Fe₂O₃, CoO, CrO, Cr₂O₃, CrO₂, CuO, SnO, Ag₂O, CuAlO₂, SrCu₂O₂, LaMnO₃, PdO or the like.

12. The light-emitting device of claim 1, wherein the base substrate includes
15 a luminescent layer, a passivation layer, and the second connecting pads are formed over the passivation layer.

13. The light-emitting device of claim 12, wherein the luminescent layer
includes ZnSe-based material.

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14. The light-emitting device of claim 12, wherein the luminescent layer is
made of a material blend including at least one phosphor powder and benzocyclobutene
or an epoxy-based negative resist.

15. The light-emitting device of claim 12, wherein the passivation layer of the base substrate includes SiO₂.

16. The light-emitting device of claim 12, wherein the base substrate further
5 comprises:

a second substrate; and

a reflective layer over a surface of the second substrate;

wherein the luminescent layer is placed over a surface of the reflective layer.

10 17. The light-emitting device of claim 16, wherein the second substrate includes a silicon-based material.

18. The light-emitting device of claim 16, wherein the reflective layer includes a metallic material.

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19. The light-emitting device of claim 16, wherein the reflective layer includes an insulating dielectric material.

20. A process of forming a light-emitting device, comprising:
20 forming a light-emitting unit provided with a plurality of first connecting pads, wherein the light-emitting unit is configured to emit a first light radiation;
forming a base substrate provided with a plurality of second connecting pads, wherein the base substrate is configured to emit a second light radiation when stimulated with the first light radiation;

forming a plurality of conductive bumps on either the first or second connecting pads; and

connecting the first and second connecting pads via the conductive bumps.

5 21. The process of claim 20, wherein the first and second connecting pads via the conductive bumps comprises:

 placing the light-emitting unit so that the conductive bumps contact with the second connecting pads of the base substrate; and

 performing a reflow process.

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 22. The process of claim 20, wherein the conductive bumps include solder bumps.

 23. The process of claim 20, wherein forming a light-emitting unit
15 comprises:

 forming a multi-layer structure including a first substrate, a first cladding layer, an active layer, a second cladding layer and a second ohmic contact layer;

 patterning the multi-layer structure to expose an area of the first cladding layer;

 forming a first ohmic contact layer on the exposed area of the first cladding

20 layer,

 forming an insulating layer to cover a portion of the multi-layer structure,

wherein the insulating layer exposes areas of the first and second ohmic contact layers;

and

forming the first connecting pads in the exposed areas of the first and second ohmic contact layers.

24. The process of claim 23, wherein the first substrate includes a sapphire
5 substrate, a SiC substrate or the like.

25. The process of claim 23, wherein the first cladding layer includes an n-type GaN layer.

10 26. The process of claim 23, wherein the active layer includes a multi-quantum well multi-layer structure or a single well structure.

27. The process of claim 23, wherein the second cladding layer includes a p-type GaN layer.

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28. The process of claim 23, wherein the first ohmic contact layer is made of a metallic alloy including Ti/Al, Ti/Al/Ti/Au, Ti/Al/Pt/Au, Ti/Al/Ni/Au, Ti/Al/Pd/Au, Ti/Al/Cr/Au, Ti/Al/Co/Au, Cr/Al/Cr/Au, Cr/Al/Pt/Au, Cr/Al/Pd/Au, Cr/Al/Ti/Au, Cr/Al/Co/Au, Cr/Al/Ni/Au, Pd/Al/Ti/Au, Pd/Al/Pt/Au, Pd/Al/Ni/Au, Pd/Al/Pd/Au, Pd/Al/Cr/Au, Pd/Al/Co/Au, Nd/Al/Pt/Au, Nd/Al/Ti/Au, Nd/Al/Ni/Au, Nd/Al/Cr/Au, Nd/Al/Co/A, Hf/Al/Ti/Au, Hf/Al/Pt/Au, Hf/Al/Ni/Au, Hf/Al/Pd/Au, Hf/Al/Cr/Au, Hf/Al/Co/Au, Zr/Al/Ti/Au, Zr/Al/Pt/Au, Zr/Al/Ni/Au, Zr/Al/Pd/Au, Zr/Al/Cr/Au, Zr/Al/Co/Au, TiN_x/Ti/Au, TiN_x/Pt/Au, TiN_x/Ni/Au, TiN_x/Pd/Au, TiN_x/Cr/Au, TiN_x/Co/Au, TiWN_x/Ti/Au, TiWN_x/Pt/Au, TiWN_x/Ni/Au, TiWN_x/Pd/Au,

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TiWN_x/Cr/Au, TiWN_x/Co/Au, NiAl/Pt/Au, NiAl/Cr/Au, NiAl/Ni/Au, NiAl/Ti/Au,
Ti/NiAl/Pt/Au, Ti/NiAl/Ti/Au, Ti/NiAl/Ni/Au, Ti/NiAl/Cr/Au or the like.

29. The process of claim 23, wherein the second ohmic contact layer is made
5 of a metallic alloy including Ni/Au, Ni/Pt, Ni/Pd, Ni/Co, Pd/Au, Pt/Au, Ti/Au, Cr/Au,
Sn/Au, Ta/Au, TiN, TiWN_x, WSi_x or the like.

30. The process of claim 23, wherein the second ohmic contact layer is made
of a transparent conductive oxide including indium tin oxide, cadmium tin oxide,
10 ZnO:Al, ZnGa₂O₄, SnO₂:Sb, Ga₂O₃:Sn, AgInO₂:Sn, In₂O₃:Zn, NiO, MnO, FeO, Fe₂O₃,
CoO, CrO, Cr₂O₃, CrO₂, CuO, SnO, Ag₂O, CuAlO₂, SrCu₂O₂, LaMnO₃, PdO or the
like.

31. The process of claim 20, wherein forming a base substrate comprises:
15 forming a luminescent layer;
forming a passivation layer covering the luminescent layer; and
forming the second connecting pads over the passivation layer.

32. The process of claim 31, wherein the luminescent layer includes
20 ZnSe-based material.

33. The process of claim 31, wherein the luminescent layer is made of a
material blend including at least one phosphor powder and benzocyclobutene or an
epoxy-based negative resist.

34. The process of claim 31, wherein the passivation layer includes SiO₂.

35. The process of claim 31, wherein forming the base substrate further
5 comprises:

forming a reflective layer over a surface of a second substrate; and
forming the luminescent layer over a surface of the reflective layer.

36. The process of claim 35, wherein the second substrate includes a
10 silicon-based material.

37. The process of claim 35, wherein the reflective layer includes a metallic
material.

15 38. The process of claim 35, wherein the reflective layer includes an
insulating dielectric material.

39. The process of claim 23, wherein patterning the multi-layer structure to
expose an area of the first cladding layer comprises:
20 forming a photoresist pattern;
etching through the photoresist pattern until an area of the first cladding layer is
exposed; and
removing the photoresist pattern.

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